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THE DIMENSIONS OF THE ATHENA PARTHENOS.

The Parthenon, the highest product of Greek architecture, adorned with the most perfect gems of Greek sculpture, was a fitting home for Pheidias' masterpiece, the chryselephantine statue of the goddess Athena. Renewed interest has been aroused in that work by the discoveries of the Lenormant and Varvakion Athenas, and the republication of two Crimean medallions identified as copies of the Parthenos by Kieseritzky. Again, Dörpfeld's remeasurement of the plan-features of the Parthenon, including the extant traces of the Parthenos-pedestal, and the recently proposed plans of Durm and Magne to preserve and restore the fast crumbling ruins of that temple, have turned the attention of archæologists in the direction of metrologic computations as a necessary preliminary to conjectural reconstructions, whether of the temple or of the image it was built to house.

In view of this, it was thought that the following investigation of the dimensions of the Pheidian statue, the outgrowth of an examination of a paper by Professor Athanasios Rhousopoulos, of the University of Athens, might not be without the interest of timeliness. In 1895, a little pamphlet by Professor Rhousopoulos appeared entitled: **Ὁ Παρθενών**, "*a protest against the proposed plans for the restoration of the Parthenon, with the suggestion of a method for its preservation.*" In this able and interesting monograph, Chapter E′ (pp. 45 to 60) is devoted to questions relating to the size and position of the statue of Athena. Here the author advances one or two theories on which archæologists may well take issue with him. It is the purpose of this article to briefly review the chapter, and to point out the questions which seem to have needlessly troubled the author.

Writing concerning the principle of economy used in the construction of the Parthenon, especially in the substitution of cheaper for more costly material in places where it could not be detected by the eye, he illustrates his point by calling to mind the well-known oblong space in the *cella*, paved with common stone instead of with Pentelic marble like the rest of the floor. Boetticher, in his Parthenon investigations, had supposed this spot to indicate the position of the table on which the prizes for victors in the Panathenaic games were deposited. Rhousopoulos, on the contrary, with others, thinks that such a radical architectural departure could have been made only for some more permanent article of furniture than a table, and could have marked the site of nothing less important than the image of Athena. He says: "Had it stood in Boetticher's alcove, which is paved like the rest of the temple, Iktinos and his co-workers would have used in vain twenty-four square metres of Pentelic marble." So far his reasoning is good, although the area is overstated; for only 18.5 sq. m. are demanded by the proportions of the pedestal of the Varvakion copy presently to be discussed, and only 13.624 sq. m. of marble flags were saved by the substitution of stone ones in the actual location. He next proceeds to advance against Boetticher's theory another argument, namely, the size of the statue; saying that if it really was as large as Pliny says it was (*NH.* xxxvi. 18), twenty-six cubits in height, there was no room for it, either in Boetticher's alcove or in the temple itself.

He then tries to prove this astonishing statement by figures, basing his calculations upon a cubit of 0.444 m. derived from a Greek foot of 0.296 m., and thus makes the statue 11.544 m. high. This figure he applies to the chryselephantine statue itself, exclusive of the base, which he thinks Pliny would have mentioned had he included it in his dimensions, because of the varying heights which pedestals may have, whether the statue be large or small. Pliny tells us, in the passage just cited, that the base in question had represented in relief upon it the birth of Pandora, twenty gods being present at the scene. The least possible height of such a base Rhousopoulos concludes must be as much as 2.50 m. This, added to the figure already proposed for the image, gives us a total of 14.044 m. as the height of the statue and its base. Next, from various indications of an architectural character, Rhousopoulos estimates that the ceiling of the *cella* was 13.50 m. from the floor. This would make the statue 0.544 m. higher than the structure of the temple would permit, a difficulty which he overcomes by suggesting that the height of the Athena Parthenos, as given in our editions of Pliny, is wrong. The majority of the extant manuscripts go back no further than the fourteenth or fifteenth century of the Christian era, while the earlier are incomplete, leaving ample time for the texts to have been corrupted and the copyists to have carelessly written XXVI for Pliny's XVI.[1] Sixteen cubits would make the statue proper 7.104 m. high. Adding the conjectured base, we have a total of 9.604 m. Pausanias (I. 24. 5) tells us that the Nike, which the goddess held in her hand, measured nearly four cubits, which according to Rhousopoulos' calculations would be 1.776 m., or one-fourth the size of the Athena herself. Aside from the manuscript testimony, Professor Rhousopoulos would regard a height even of twelve cubits = 5.328 m. as a probable one for the statue without the pedestal.

This is the argument made by Rhousopoulos. The three points on which a close examination will perhaps show that he is in error, are the following: (1) The height of the base; (2) Pliny's figure; (3) The ratio of the height of Nike to that of Athena.

Let us consider the first, the height of the base. Rhousopoulos is hasty in assuming that Pliny, if including the base in his measurements, would have mentioned it. We find in few ancient writers the accuracy which modern scholarship demands, but, on the contrary, always the tendency to make a story sound as big as possible. This is especially true in Pausanias (V. 10), who gives as the dimensions of the temple of Zeus at Olympia 230 by 95 feet. Excavations have proved that the temple proper was only 200 feet long by 86¼ feet wide[2], and that he included in his figures the lower step of the stereobate and a platform. The query to-day in the mind of one viewing for the first time the Bartholdi statue in New-York Bay is, *How high is it?*—meaning the elevation of the torch rather than the actual height of the bronze figure of Liberty.[3] The more natural thing on Pliny's part, we believe, would be to include the base, unless some statement be made to the contrary. Let us assume then, for a working basis, 26 cubits as the height of the whole work, base and statue together, and let us make our calculations, using the old Greek foot of 0.296 m., which Rhousopoulos employs, instead of the so-called Attic foot of 0.308 m., which seems not to have been the true standard of measurement employed in the construction of the Parthenon.[4] The reason for this choice will be apparent when we come to discuss the size of the winged Nike which Athena held in her hand. The cubit of this foot is 0.444 m., and it gives us as the height of the statue 11.544 m.

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[1] Neither statement holds good for the leading MS. of the *NH*, the Bambergensis, which dates from the tenth century, and is complete for the art-history books XXXIV to XXXVI.

[2] BAUMEISTER, *Denkmäler*, vol. II, p. 1101; *Olympia*, *s. v.*

[3] "The statue of Liberty in New York harbor is 305 feet high" (*Ithaca Daily Journal*, Sep. 22, 1896).

What then must be deducted from this number for the base? Dörpfeld[5] gives 8.04 m. by 4.09 m. as the size of the marginal line, the trace of which is extant all around the rough-stone pavement, and which is the indubitable site of the statue. We then have a surface 8.04 m. long on which to sculpture in relief at least twenty figures of gods according to Pliny (*HN*, XXXVI. 18). This would give to each individual a space 0.40 m. wide, unless we conceive that the reliefs extended to the sides of the pedestal, a method of composition which would break the unity of the scene. If we take the number proposed by Rhousopoulos (2.50 m.), as the height of this surface, these figures must be life-size or even greater, and ample space would still be left for mouldings. But 0.40 m. standing-room is an exceedingly small allowance for an adult. Such a crowded relief could have had only a constrained and inartistic appearance, an impossibility in a production from the hand of Pheidias.

Turning to the Parthenon-frieze, on the east side where the Olympic deities are represented as sitting and watching the passing procession, we find in a space of twenty-seven feet, or 8.23 m., twenty figures, twelve of them seated divinities.[6] Moreover, the design, at least of this frieze, was in all probability the work of the master who executed the Athena Parthenos. Seated figures, while economizing room, would at the same time be more in accord with the character of the scene, as we see from a similar work by Pheidias, the birth of Athena in the east pediment of the Parthenon, where only two of fourteen extant figures, mostly divinities, are standing. We may safely conclude that the sculptured part of the pedestal was of about the same height as the frieze surrounding the *cella*-wall, 1.01 m.[7] The question now arises: How much are we to allow for the mouldings of the pedestal?

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[4] HULTSCH, *AZ.* 1880–81, p. 172: *Bestimmung des Attischen Fusses*; DÖRPFELD, *Mittheilungen Athen.*, vol. VII, 1882, pp. 277–312.

[5] *Mitth. Athen.*, vol. VI, PLATE II, reproduced in Fig. 1362 of BAUMEISTER'S *Denkmäler*.

[6] MICHAELIS, *Der Parthenon*, Atlas, plate 14, figures 23–42 of Ostfries.

The most perfect replica of the Athena Parthenos in existence is doubtless the Athena Varvakion in Athens, which Lange, in a paper published a number of years ago, has so conclusively shown to be a copy of Pheidias' masterpiece. His conclusion is based upon measurements, taking as the ground of his argument the measuring points found on the back of the statuette, and also the proportional size of the Nike and the statue proper.[8] Assuming, then, that it is a measured copy, we find that the plinth of the Varvakion statuette measures 0.103 m. in height, the statuette plus plinth, 1.035 m. Letting x equal the height of the Parthenon pedestal, we have the following proportion: 1.035 m. : 0.103 m. = 11.544 m. : x or 1.149 m. We had already decided that the reliefs of the base must occupy a space of 1.01 m. This verifies our conclusion and leaves a margin of 0.139 m. for a narrow moulding or possible correction to our calculation.

The width of the quadrangular outline on the *cella*-pavement demands a base 4.09 m. in depth. The back of the Varvakion plinth is roughly finished and not rectangular. From front to back in its widest part it measures 0.333 m.; from right to left, 0.41 m. The reliefs are not reproduced, and everything points to the conclusion that, excepting possibly in the relative height, no attempt at an accurate copy of the Parthenon pedestal was made. However, from 0.333 m. we can calculate a depth of 3.71 m., just 38 cm. less than the floor demands, a discrepancy not surprising when we consider the careless execution of the Varvakion base.[9]

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[7] PENROSE, in his *Principles of Athenian Architecture*, gives the average height of the *cella*-frieze as 3.33 ft. (1.01 m.).

[8] *Die Athena Parthenos, Mitt. Athen.*, vol. VI, p. 1.

[9] If 11.544 m. is the correct height, 0.367 m. would have been the true proportional measure for the depth of the Varvakion plinth. It seems likely that the sculptor accommodated his pedestal to the given dimensions of a block of marble not fully one cubit wide by three-quarters of a cubit deep. Both width and depth are

The dimensions, then, of the Parthenon-pedestal were approximately 8.04 m. × 4.09 m. × 1.15 m. So low a base may seem strange to us with our modern notions of statuary, for our statues have rather high pedestals, often, perhaps, that people may be prevented from handling the marbles. There was no need of this in the case of the Parthenos, where, as was also true of the statue of Zeus at Olympia, the people were kept from the image by a railing.

This brings us to the second point of disagreement with Rhousopoulos, namely, his proposed emendation of Pliny. If the view that the base was included in Pliny's measurements be accepted, a view which the height of the Varvakion plinth and the width and spacing of the figures of the Parthenon-frieze seem to verify, it has been conclusively shown that no such correction is necessary. There would be nearly 2.0 m. between the tip of Athena's helmet and the ceiling, according to Rhousopoulos' assumption that the *cella* was 13.50 m. high. Perhaps the distance would be even greater, because Boetticher and others conjecture the ceiling to have been fourteen metres from the floor. As Athena's slender helmet-decorations rose over a metre from the head-piece, this distance to the ceiling would seem even greater than it really was. To have the statue fill almost the whole space between the floor and ceiling, would not have been so distasteful to the Greek eye as to ours. We must also recall the dislike for vacancy seen in all Greek reliefs, and in the earlier vase-paintings, where the unused backgrounds were filled with zigzags and geometric ornaments. The statues of the ancient temples seem always to have been large in proportion to the space. It was a criticism of Pheidias' Olympic Zeus that it was too large for its temple. Strabo

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noticeably scant for the figure and its attributes. The height of the marble is within one millimetre of three and a half Greek feet, 1.036 m. This was just half of the ordinary statue-size of seven feet, and suggests the probability that the Varvakion Athena was copied from such a marble, rather than directly from the chryselephantine Parthenos image. Or we may consider the dimensions of the statuette as determined by the intention of making it half life-size; for the Athena herself is just about 80 cm. high. The mouldings of the pedestal are not continued round the corners, and its width is less than four-thirds, instead of nearly double its depth, as indicated by Dörpfeld's measures of the outline on the *cella*-pavement, 4.09 m. by 8.04 m. An enlargement to the original scale would leave unoccupied nearly three and a half metres (3.47 m.) of the breadth of the supposed pedestal-outline.

describes it as nearly touching the ceiling with its head.[10] The same effect may be seen in the restoration of the statue of Asklepios at Epidauros, and from Pausanias (III. 19. 1) we learn that the image of Apollo at Amyklai was thirty cubits, that is forty-five feet, high, and so must have reached nearly to the ceiling.

Turning to the third point advanced by Rhousopoulos, the relative height of the Nike and Athena, the proposition made seems preposterous. Imagine a statue holding on its outstretched arm a figure one-third or one-fourth its own size! The smallest possible ratio would be that of 1 to 5. A smaller ratio would give a figure so large that Athena could not have supported it gracefully and naturally without apparent effort. Can we verify the ratio of 1 to 5?

Lange, in his article *Die Athena Parthenos* (*MIA*, VI, 56), works out some of the dimensions of Pheidias' statue, basing his calculations upon the measurements of the Athena Varvakion (*MIA*, V, 371). He figures, however, with the Attic foot (0.308 m.) and makes the statue 12.012 m. high. Such a foot would make the Nike in the hand of Athena over six English feet in height, and would preclude the possibility, or at least the likelihood, that Pheidias copied a living model. The employment of the Greek foot of 0.296 m. in the construction of the Parthenos is confirmed by the fact that the distance between the crest of Athena's helmet and the ceiling is made greater by more than half a metre, and also by the observation that the height of the Varvakion statuette, 1.035 m., equals $3\frac{1}{2}$ Greek feet, a round number, which shows that the statuette also was made by this standard of measurement. Another argument is that this foot gives us a pedestal of a height nearer that of the Parthenon-frieze, to which, we have shown, the number of figures in its carved relief makes it similar.

The following are some of the measurements given by Lange for the Varvakion statuette:

Height, including base, - - - -	1.035 m. ($2\frac{1}{3}$ cubits).
" of base, - - - - - - -	0.103
Width of base, - - - - - - - -	0.41
Depth of base (right side), - - -	0.333 ($\frac{3}{4}$ cubit).
Depth of base (left side), - - - -	0.285

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[10] STRABO, *Geographica*, VIII. 353: *ἁπτόμενον δὲ σχεδόν τι τῇ κορυφῇ τῆς ὀροφῆς, ὥστ᾽ ἔμφασιν ποιεῖν, ἐὰν ὀρθὸς γένηται διαναστάς, ἀποστεγάσειν τὸν νεών.*

Nike (without head),	0.14
Nike (with calculated head), about	0.16
Column supporting hand,	0.444 (1 cubit).
Capital of column (height),	0.08
Base of column (height),	0.04
Diameter of shield,	0.40
Thickness of soles,	0.013
Head of statue, about	0.10

Some of the dimensions of the Parthenos, especially those of the base, we have already worked out.

With the sculptors of the fifth century B. C., the head seems to have been one-eighth of the height of the whole body, and, as the head of the Varvakion marble measures about 0.10, let us assume 0.80 as its height, exclusive of helmet and sandals. Unfortunately Lange has neglected to give the height of the Athena alone, but careful measurements on a photograph make this conjecture very probable. By a simple problem of proportion, we find the Parthenos, exclusive of head-gear and foot-gear, to measure 8.92 m. But 8.92 m. equals 30.15 Greek feet of 0.296 m. each, almost a round number. Could it not be that Pheidias intended his statue to be just thirty feet high? The figure with which we have been working we noticed that Lange gave as approximate, not exact. Correcting his 0.10 m. to 0.0995, we get as the height of the Varvakion Athena, less her decorations, 0.796 m., and then forming our proportion we have $1.035 : 11.544 = 0.796 : x$; in which x equals 8.88 m., or 30 Greek feet, the stature of the Athena Parthenos.

Assuming[11] that the Varvakion Nike was one-fifth the height of the Athena, or of 0.796 m., we get 0.159 m. which corresponds closely to Lange's estimate of 0.16 m.—$1.035 : 11.544 = 0.159 : x$ height of Parthenos Nike. Here x equals 1.776 m., equals 6 Greek feet, equals 5 feet $9\frac{9}{10}$ ins. English measure. Pheidias' model, then, was six feet high according to Greek standards, or almost five feet ten ins. by ours, certainly more than the average height of a woman, but not an incredible height.[12] Moreover, 1.776 m. is contained in 8.88 m. five times, or the ratio between the Nike and Athena is 1 to 5, the hypothesis with which we started.

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[11] The head of the Varvakion Nike is missing.

[12] The "Anthropometric Table compiled from the measurements of 1100 Wellesley students" by Misses Hill and Wood of the Wellesley College Gymnasium gives twenty-five normal sizes ranging from 1.48 m. = 53.3 inches to 1.72 m. = 67.7 inches.

What was the height of the decorations of the goddess, such as her helmet and sandals? These were elaborate; for Pausanias tells us that the former had its crest supported by a sphinx, and that on either side of the helmet were griffins. The Varvakion statuette would lead us to believe that the supporters of the secondary crests were winged horses, and that the griffins decorated the cheek-pieces—as the gem of Aspasios and the medallions found in the Crimea show us. Pliny states that the sandals were decorated with reliefs representing combats of Lapithai and Centaurs. According to our calculations they must have been about 0.15 m. (or a half-foot) high.

Subtracting from 0.932 m. (the height of the Varvakion copy less the plinth) 0.796 m., we have 0.136 as the height of the helmet and sandals of the statuette: 1.035 m. : 11.544 m. : : 0.136 m. : x or 1.516 m. (the perpendicular measure of the helmet and sandals of the Parthenos). But 1.516 m. equals 5 Greek feet plus 0.036 m., nearly a round number. We have seen that the respective heights of the Nike and Athena were round numbers, and why should it not be the case with the base, and with the ornamental accessories such as the helmet and the soles? We noticed that the dimensions of the Varvakion plinth did not seem accurate measurements. Possibly they will admit of correction. Adding to 1.149 m. (the number which we estimated as the height of the pedestal) this 0.036 m. which seems superfluous in the helmet measurements, we have 1.184 m., equivalent to exactly four Greek feet. This gives us, besides the relief, over half a foot for mouldings. As we estimated the soles at about a half-foot, this would leave for the distance from the top of the head to the crest of the helmet 4½ feet. The importance of thus obtaining round numbers as a result of the investigation can hardly be overestimated, for Pheidias, in planning his statue, would not have determined upon other than full or half feet as his principal dimensions. Our chief criticism of Lange's investigation of this subject lies in the fact that his results are decimal rather than whole numbers.

By a calculation similar to what we have already used, we find the height of the column on which rested the hand bearing the

Nike to have been 16.5 Greek feet, and the diameter of the shield, 15.07 feet, the latter also nearly a round number.

To sum up our results:

The full height of the Parthenos was	11.544	m.	or 39.	Greek	ft.;
the base of the Parthenos equals	1.184	“	or 4.	“	“
the Nike,	1.776	“	or 6.	“	“
the Athena,	8.880	“	or 30.	“	“
the helmet, plus soles,	1.480	“	or 5.	“	“
the soles,	0.145	“	or 0.5	“	“
the helmet,	1.367	“	or 4.5	“	“
the column,	4.952	“	or 16.76	“	“
the capital of the column,	0.892	“	or 3.014	“	“
the base of the column,	0.446	“	or 1.507	“	“
the diameter of the shield,	4.461	“	or 15.07	“	“

Furthermore, we can verify this conclusion in part from ancient writers. Taking Pliny's twenty-six cubits as the height of the Athena Parthenos, and Pausanias' four cubits as that of the Nike, and comparing their figures with those derived from the Varvakion-statuette, we get the equation: 1.776 m. : 11.544 m. = 4 : 26; or without any correction 46.165 equals 46.176, which is as accurate a result as one could expect. A second look at the foot-measurements we have just recorded will convince the reader that the cubit, rather than the foot, was the unit uppermost in the mind of the artist, and further that the leading dimensions of his colossal statue were originally conceived either as units and multiples of one, two, three, four, and five cubits, or as additions of such units and multiples. A premeditated numerical relation to the dimensions of the *cella* would appear, if we should assume the height of the temple-ceiling to have been 13.32 m., or exactly thirty cubits; but this is mere conjecture.

The height of the pedestal was	4 feet	3 cubits
The height of the separate plinths placed under the feet of the statue in the form of Tyrrhenian sandal-soles, and perhaps also of those placed under the shield and the column, was	½ foot	
The height of the statue, barefoot, was		20 cubits
From the crown of its head to its helmet-crest was		3 cubits

The total height of the image was	26 cubits
The clear space above the crest was, perhaps,	4 cubits
The height of the ceiling was, perhaps,	30 cubits

The diameter of the shield was $\frac{20}{2} = 10$ cubits.

The height of the base, and the diameter of the column were	1 cubit
The height of the shaft of the column was	8 cubits
The height of the capital of the column was	2 cubits
The total height of the column was, probably,	11 cubits
The height of the Nike was	$\frac{20}{5} =$ 4 cubits
The collective height of column and Nike was	15 cubits

A simple proportion is seen to subsist not only between the height of the Nike and that of the (barefoot and bareheaded) Parthenos (1 : 5), but also between the Nike and the pedestal (3 : 2), the column-shaft (1 : 2), the column-capital close beneath the Nike (2 : 1), the height of the helmet-crest (4 : 3), and the hypothetical vacant space between statue and ceiling (1 : 1). The ratio of the elevation of the Nike to the height of the shield was 3 : 2.

The plan-dimensions of the pedestal of the Varvakion statuette, forming, as they do, a 3 × 4 rectangle, are incommensurate with either of the quadrangles marked in the pavement. One of these is exactly, and the other nearly, a double square. The larger outline would easily enclose a structure measuring 9 by 18 cubits. Whereas an enlargement of the statuette by the proportion of 7 : 78 employed in the remainder of our computations, with some extra allowance on account of the extreme scantness of its pedestal-surface, would barely fill a space measuring 13½ feet = 9 cubits by 13½ cubits.

To sum up the positive results of our investigation: there has been an endeavor to show (1) that, contrary to Rhousopoulos' theory, the base was included in the height of twenty-six cubits given by Pliny; (2) that said base was four feet high; and (3) that the height of the Parthenos was not too large for the dimensions of the *cella.* Furthermore, I have attempted to prove (4) that the relief upon the base was about as high as the *cella*-frieze of the Parthenon; (5) that the ratio between the Nike and Athena was 1 to 5; and (6) that, in general, Pheidias used round numbers in his principal dimensions. Whether the cubit and foot of Pheidias tallied with those of the Varvakion statuette or with a different, local standard, does not affect the above conclusions. A smaller unit would, of course, tend to confirm our assumption of a life-size model having preceded the colossal one. In the contrary case, and especially if we conceive the sculptor to have employed the hypothetical Attic foot of 308 millimetres, this inherently probable assumption would lack numerical confirmation.

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NOTE BY ALFRED EMERSON.

DR. DÖRPFELD has had the kindness, during his recent visit to Cornell University, to look over the proof-sheets of the above paper, and has made some suggestions as to method of presentation, which in the author's absence I have ventured to incorporate. He has also resolved the doubts concerning the relation between the foundation of Peiraieus-stone (2.61 m. × 5.22 m.) and the larger quadrangular outline (4.09 m. × 8.04 m.), which had troubled Miss Perry and me, by assuring me of the presence of pry-holes, and of clamp-holes between the two outlines as well as within the smaller quadrangle. These marks show the exact position of the separate blocks of marble and the stone pedestal of the temple-image. The notion, put forward in Penrose's *Principles of Athenian Architecture*, that the larger outline is the trace of a railing, is not consistent with the presence of these holes. The limestone pavement was merely an economy, to save eight marble flags of the size used for the whole nave or central space of the Hekatompedos. Thirteen and five-eighths square metres of the costlier material were thus economized where thirty-two might have been. The figure of 13.5 sq. m., given near the beginning of Miss Perry's article, is the amount of space which would be covered by a proportional enlargement of the Varvakion statuette; for the actual dimensions of the outline of the pedestal could not be considered, of course, in connection with Boetticher's alcove.

Dr. Dörpfeld also calls my attention to the bearing which the exact data for the dimensions of the pedestal of the great Zeus at Olympia have on the problem of the size of the chryselephantine statue of Pheidias at Athens. These data are described and discussed by him in the *Ergebnisse der Ausgrabung von Olympia*, vol. II (Architectural Remains), pp. 13–15; compare Plates IX, XI, and XII in vol. I of the accompanying Atlas. Unfortunately, Miss Perry did not have access to this work while writing her article. The relief-space of the Olympian statue is 73 cm. high, the height of the upper and lower mouldings (which correspond in form to the indication of them on the plinth of the Varvakion statuette) is 19 cm. and 17 cm. respectively, making the total height 1.09 m. But as the Olympian pedestal stood on a level with the superadded portico-stylobates of the temple-*cella*, the black-marble floor just in front of it being sunk 10 cm. lower, it is perhaps legitimate to state its effective height at 1.19 m. This is practically identical with Miss Perry's computation of the height of the Parthenos-pedestal at 1.184 m. On the other hand, her assumption that the height of the relief was the same as that of the Parthenon-frieze would seem to prove erroneous. The vertical divisions of the Olympian pedestal analyze readily as follows, upon the hypothesis of the Græco-Roman foot of 0.2957 or 0.296 m. (Dörpfeld in *MIA*. VII, 1882, p. 299):

		Actual measure.
Cap-moulding . . .	9 dactyls=0.166+m.	0.168 m.
Relief-space . . .	2 feet 8 dactyls=0.739 m.	0.73 m.
Base-moulding . . .	10 dactyls=0.185 m.	0.192 m.
Plinth	5 dactyls=0.092+m.	0.10 m.
Total elevation from black pavement,	4 Græco-Roman feet=1.183 m.	1.19 m.

The measures of the ground-plan of the Olympian pedestal indicate an intentional proportion of 2 : 3. Fifteen Græco-Roman cubits of 0.4435 give us 6.652 m. for the front of the pedestal, and twenty-two and a half cubits of 9.979 m. for its depth or side. The actual measurement is 6.65 m. × 9.93 m. The number of figures across the front was seventeen at Olympia as against twenty-one at Athens.

The above analysis does not command Dr. Dörpfeld's endorsement, since his abandonment of the Græco-Roman or Solonian foot of cca. 0.296 m.—as the standard measure of length employed by the builders of the temple of Nike and also of the Parthenon—and his adoption of the Aiginetan foot of cca. 0.326 m., which he also traces in some leading dimensions of the temple at Olympia. But it will always be difficult to regard as improbable the use, by Pheidias, of the Solonian cubit, foot, and dactyl (1) in the face of Dörpfeld's own discovery that the shorter of these two Greek feet was the fundamental unit of the Solonian metric system—for its hollow and liquid measure and its measures of weight, as well as for dimensions of length and area; (2) in the face of his own demonstration that it tallies with the small mouldings and other minute members of the temple of Athena Nike, built in the fifth century; and (not to lay stress on his somewhat more dubious computations as to intentional dimensions in Solonian feet and dactyls about the Parthenon) (3) so long as the floor of the Hekatompedos-*cella* continues to be regarded as measuring 29.55 m., clear, in length.

It is due to Miss Perry to say that she desired to lay no stress on what seemed to her the fair probability of the use of this Greek foot and cubit in the construction of the Athena Parthenos. Her use of it, *argumenti causa*, is traceable mainly to its having furnished the basis of Professor Rhousopoulos' calculations. The theory that the sculptor of the Athena Parthenos was enough of an architect to be governed, in a measure, by his yardstick has, in my opinion, been carried by her proportional calculations to a degree of logical certainty which subsequent proof of its having been cut and marked according to this or that particular Greek cubit and foot and dactyl will in no wise invalidate.

A minor non-concurrence on the part of Dr. Dörpfeld relates to the text of Pausanias when he states the dimensions of the temple of Zeus to be 230 by 95 feet (v. 10): "He probably notes the numbers which the guides at Olympia gave in Roman feet. His breadth-measure of 95 feet = 28.12 m. is but little wider than the breadth of the stylobate measured on the upper step (27.66 m.). If finally he gives the length as 230 feet = 68.08 m. (really 64.12 m.) the only explanation is that he included the ramp on the east front of the temple" (*Ergebnisse* p. 19). The explanation is not altogether satisfactory; for, adding the 13.10 m. of ramp to the 64.12 m. (= 200 Olympic feet), we get 77.22 m., which is over 240 Olympian and over 260 Græco-Roman feet. In any case, the Greek traveller's or his informant's human inclination to magnify the true dimensions a trifle, by including members that might have been left out or otherwise, is substantiated.

ALFRED EMERSON.

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